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This document discusses planning for educational development by means of a Planning, Programming, Budgeting System. A PPB system is defined and its basic operation is described. Various ways in which the broader purposes of governments may be classified in terms of their objectives are presented with emphasis on how the learning objective might fit into a program structure for government. With this background, a PPB system is applied to education as cost effectiveness analysis for learning. Cost effectiveness analysis is defined, measurement of alternative program costs and program effectiveness is described, and the relationship of the two elements is explored. An illustrative example of the process of cost effectiveness analysis is appended. (TT)

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CEF

NEA COMMITTEE ON EDUCATIONAL FINANCE

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Planning for Educational Development in a Planning, Programming, Budgeting System

CEF

NEA COMMITTEE ON EDUCATIONAL FINANCE

Prepared by the State-Local Finances Project
The George Washington University
Washington, D.C. 20036

For the Committee on Educational Finance
National Education Association
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Foreword

As STATE AFTER STATE, and locality after locality, turns to the implementation of a programming-planning-budgeting (PPB) system, educators, both administrators and teachers, and the lay public—school-board members, state legislators, and other interested citizens—need to be aware of these developments and their implications for schools.

The NEA Committee on Educational Finance sponsored the preparation of this document so that educators and citizens would focus on a PPB system consistent with the PPB system developed for other state and local government services by the State-Local Finances Project of The George Washington University under the direction of Dr. Selma J. Mushkin. This document, drawing as it does on the earlier experience and research studies by members of the project staff, provides a basis for a dialogue between educators and others implementing a PPB system.

The Committee on Educational Finance, furthermore, seeks to bring these developments in general government and school administration to the attention of classroom teachers and curriculum specialists because if a PPB system is to operate effectively with attention to products, process, and resources, the expertise of classroom teachers and curriculum specialists must be brought to bear. As this document points out, there is a need for discussion among educators to assure contributions of these members of the profession as well as of the planning and budgeting officials in the planning for educational development.

This document hopes to provide the framework within which PPB systems can develop for schools through cooperation of all those interested in furthering an integrated planning-programming-budgeting system for education as well as for other governmental services.

William D. Firman, Chairman
NEA Committee on Educational
Finance, 1967-68

Planning for Educational Development in a Planning, Programming, Budgeting System

Selma J. Mushkin and *James R. Cleaveland*

I. What Is a PPB System?

THE PRESENT PAPER is prepared in response to the frequently posed question of legislators, school administrators, and school boards:

What is a PPB system and what does it mean for education?

Planning, programming, budgeting (PPB) as an integrated system is gaining widespread use because of the growth in public expenditures and the consequent urgency of asking:

How better—more effectively and efficiently—can available resources be allocated among competitive uses?

Tax resources and the resources of men and material needed in support of public services are clearly not unlimited, and the demands on those resources are many. Education, as a major component of public expenditures, now claims a principal share of tax resources. And in view of the role assigned to education in meeting current economic and social problems, further expansion in educational spending is projected.[1] In addition to economy and efficiency in program operations, current national problems point also to concern for greater equity in the use of tax resources for the attack on poverty and the education of the disadvantaged.

Public officials, school boards, school administrators, teachers, and parents all contribute to school policy. Each of these groups is concerned with the public product produced—its quantity and quality—by the school and its progress toward satisfying the purposes of educational spending.

Implicit in a PPB system is a continuing process of review and analysis of all programs and activities of a school system. On-going programs as well as new programs are considered. This review of the total operation in line with the current objectives of the schools is perhaps the best defense against obsolescence. A PPB system can help to facilitate better public decisions on use of resources by providing policy makers, whether at the

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Dr. Mushkin is Project Director, and Mr. Cleaveland is Research Scientist.

[1] Mushkin, Selma J., and McLoone, Eugene P. *Local School Expenditures: 1970 Projections.* Chicago: Council of State Governments, 1965. 84 p.

legislative or executive level, with the information required to sort out choices and to help define the choices. While PPB has been addressed largely to executive decision making, the processes of PPB can also be applied to facilitate the critical decisions of the legislators.

PPB and the legislature—Implementation of a planning, programming, budgeting system in the executive branch of the government would provide legislators with more data about program proposals submitted to them and better documentation of budgetary requests. It thus would provide legislators with the informational materials required for a greater understanding of the policy problems and the alternative approaches to them. The legislatures may have an independent analysis staff. Such a unit would aid in review and assessment of the informational materials provided to the legislature by the executive. It would permit careful evaluation of program trends and enable the legislators to propose effective alternatives to those submitted by the executive departments and agencies.

Federal encouragement—The growing need for program planning and evaluation as a management tool has encouraged states and localities, as well as educational authorities, to begin the process of implementing such a system. This encouragement has been augmented by the emphasis of several of the recent federal aid programs on planning and on program evaluation. The Elementary and Secondary Education Act, for example, now seeks to encourage integrated planning of education, the development of objective measures of program consequences, and the testing of programs in terms of these objective measures.

An intergovernmental demonstration—Five states, five cities, and five counties have undertaken to work together through the initial stages of a PPB system and to reassess intergovernmental program problems within this framework. This 5-5-5 Project, financed by a grant to The George Washington University from the Ford Foundation, as a demonstration, is providing information on the processes, the potentials, and the issues involved in instituting an integrated system for planning public services and the facilities to provide them. The states participating in this demonstration are California, Michigan, New York, Vermont, and Wisconsin; the cities are Dayton, Denver, Detroit, New Haven, and San Diego; the counties are Dade (Fla.), Davidson (Tenn.), Los Angeles (Calif.), Nassau (N.Y.), and Wayne (Mich.).

A PPB System Defined

A PPB system is an integrated system to provide executive and legislative officials with better and more information for planning programs and for making choices among the optional ways funds can be devoted to achieve governmental objectives. It aids the decision-making processes in helping find new ways, through analysis and evaluation of public programs, of doing the public business faster, better, and less expensively.

Analysis and program evaluations that are central to the implementation of a planning, programming, budgeting system require identification of the public products that society desires. Such identification of public goods and services marks a shift in emphasis. The question of whether there should be 30 or 20 pupils per

teacher is replaced, for example, by how much of what type of learning do we want in our schools. Analysis requires that activities be considered as they relate to each other, some complementary, some competitive. The search for alternative ways of meeting defined objectives makes PPB a socially innovative system. Also considered are the optional ways of combining, for example, teaching staffs, teacher aids, facilities, and teaching materials, to effect the product desired. The important question routinely asked in the course of implementation of a PPB system is:

How much additionally would be gained or lost by way of achieving the defined objective through spending more or less for the purpose?

Better staff analysis and program evaluation will reduce some of the pressures on public officials that originate in failure to consider program consequences ahead of time.

An integration of familiar techniques—Within a PPB system the familiar processes of program development and of budgeting are explicitly combined. It is a system in the sense of centering on program analysis in the light of explicitly defined objectives. It calls for program plans that can carry out these purposes and for budgetary requests that can help implement the planned programs. It is a system, too, in another sense, in that it calls for the identification of all activities that relate to the achievement of a defined objective. For example, it calls for the identification of the range of programs that are a part of achieving learning in the amount and of the type desired, even though not all of these programs are carried out by the traditional "educational" agencies.

The newness of PPB arises not from the individual techniques that have been developed but from their integration into a system and their procedural application to government decision making. These techniques have zeroed in on the preparation of a series of documents that are major tools of a PPB system. They are enumerated here:

1. The program structure and statement of objectives
2. Program analyses (cost-effectiveness analyses) and memoranda
3. The multi-year program and financial plan.

In the preparation of these documents the PPB system requires:

1. Clarifying and specifying the ultimate goals or objectives of each activity for which a government budgets money
2. Gathering contributing activities into comprehensive categories or programs to achieve the specified objectives
3. Examining as a continuous process how well each activity or program has done—its effectiveness—as a first step toward improving or even eliminating them
4. Analyzing proposed improvements or new program proposals to see how effective they may be in achieving program goals
5. Projecting the *entire costs* of each proposal not only for the first year but for several subsequent years
6. Formulating a plan, based in part on the analysis of program cost and effectiveness, that leads to implementation through the budget.

Statement of Objectives and Program Structure

The program structure reflects decisions on the goals and objectives

that are being sought through the government. Essentially it represents a classification of activities and programs in accord with the goods and services produced to achieve the defined objectives. Formulation of basic objectives, goals, missions, or purposes thus becomes an initial phase of implementation of a PPB system. Such goals or objectives are not value free. On the contrary, they reflect the value judgments of those who represent the public. There is, accordingly, no single perfect model of a program structure that encompasses all functions. Indeed, there are many ways of classifying programs even for a single set of defined objectives.

The program structure is intended to highlight the basic objectives and to display the competing and complementary activities involved in carrying out such objectives. It provides the framework for analyzing programs and for the preparation of a multiyear program and financial plan.

Essentially the defining of objectives of a governmental jurisdiction provides answers to a set of questions such as the following:

What needs doing and for whom?
Why is each activity currently performed being performed?

The program structure itself displays a hierarchy of program activities. At the topmost levels are the broad categories that reflect the programs designed to achieve the fundamental objectives of the government. The second and lower levels display progressively narrower groupings serving more limited objectives. As the categories become narrower in scope at the lower levels, the structure sets forth the complementary and/or substitute approaches to the fundamental objectives at the highest levels in the structure. The lowest levels of any structure would be composed of activities and programs that are intended as specific means for moving toward the larger objectives.

The display of programs in relation to objectives provides information on programs different in some ways from that contained in budget documents now submitted to legislatures. In many cases, budget documents are "line" item budgets rather than program-oriented budgets; full program costs do not always appear in the same budget category.

Implementation of a PPB system does not require that the budget format be altered, but it does require that for programming purposes expenditures be grouped in terms of program objectives rather than in terms of the items bought. In some jurisdictions budget formats have been altered.

A line item budget may show the following items with little regard to the purposes being served:

Salary and wages
Contractual service, supplies, and materials
Equipment purchases by type
Employees' retirement
Workmen's compensation.

Such a listing conveys little information about why employees are on the public payroll, why supplies are purchased, or what groups in the population benefit from the outlays. If in addition to, or in place of, such line item information, a display shows the amounts expended in relation to objectives, those officials concerned with program policies would have before them information on expenditures according to purposes, for example:

Job training and placement
—Formal vocational training
—On-the-job training
—Occupational counseling
—Employment exchange information

If in addition to such figures on expenditures, data are presented on program outputs that serve to display the volume or quality of the services provided, an additional range of supportive materials is given the decision maker. He would have set forth before him the number of persons being trained for jobs, receiving formal school training, participating in on-the-job training or in joint school-industry training, assisted in selecting training, receiving employment information, and those who on completion of their training are employed at specified earnings levels.

Program Analysis—Costs and Benefits in Alternatives

A PPB system is a unifying and comparing process. On the one hand, consequences are assessed in terms of costs, both those that are immediate and those that are implicit for subsequent periods as a result of immediate action. On the other hand, they are assessed in terms of benefits or program effectiveness. The arraying of cost and effectiveness for various program alternatives provides information required for decision.

Analysis essentially involves a reduction of complex problems into their component segments so that each segment can be studied. Questions of fact can be subjected through this process to the test of observed experience. Those aspects of the problem that involve value judgment can be separately identified and the basis of the judgment made explicit.

On the one hand, a cost-effectiveness analysis may use, if applicable, many of the techniques of mathematics, operations research, economics, etc. On the other, cost-effectiveness analysis may require no more technical sophistication than the pulling together of already existing data in a meaningful and informative way. Analyses may also draw upon various technical and nontechnical studies previously done which are relevant.

Recommendations made on the basis of analysis within the procedures of a PPB system are presented in policy papers termed "program memoranda." The "program memo" is a document covering one major program area or a major portion of a major program area. Its purpose is to present major program policy findings, specific recommendations, and the reasons for these recommendations, including a summary of the analyses that have been made. It is submitted prior to detailed budget preparation.

Linking Planning and Budget Decisions (The Multi-Year Program and Financial Plan)

A PPB system makes long-range fiscal planning a routine for government. The analysis of programs that provide the information for decision includes an examination of effectiveness over a period ahead and of cost implications for that future period. Programming is thus given a time perspective that adds to the informational base available to the decision maker. A summary of the decisions taken on public outputs and costs, at first tentatively and later for legislative budget action, is included in the Multi-Year Program and Financial Plan, one of the principal documents of a PPB system. It consists of two parts:

1. A multi-year financial plan that displays the estimated funding required (including both operating and capital requirements) for each program category for each of a number of years (usually about five) into the future

2. A multi-year program plan that is essentially a descriptive table displaying selected characteristics of each program category in order to indicate the size and scope of the program and, wherever possible, its expected accomplishments.

The multi-year program and financial plan is of particular importance at two major points in the program planning cycle.

1. The first major function of the plan is in the program analysis phase of program planning. A tentative summarization of all initial individual program decisions provides the basis for an examination of the fiscal feasibility of the over-all decisions. For example, it is likely that the tentative set of individual program decisions, when summarized in a multi-year financial plan format, will indicate a requirement for funds that is out of reach either in the current budget or in subsequent years. Revisions of the program decisions that make up the first tentative summary would then be needed.

Such a tentative summarizing does not necessarily imply that programs should be planned only to the extent that their revenue sources are *currently* authorized. The governmental jurisdiction may choose to plan for a level of expenditure exceeding that which can be raised under current revenue provisions. But the question of revision of the revenue structure will be clearly posed.

2. The plan plays its second major function after the budget has been approved by the legislative body and a revised multi-year plan is prepared to reflect the latest decisions. The plan then becomes the "base," or "baseline" displaying the jurisdiction's current multi-year plan. As such, it would provide "planners" at all levels with a perspective as to what the organization is doing and where it is headed. It also becomes the composite program "plan" to which future program proposals should be compared.

The Centralization or Decentralization of the Procedures

In some instances state governments have placed initial responsibility for developing objectives and the output-oriented categorizations of activities on departments and agencies. In others the initial dialogues with policy officials to define these objectives have been conducted by central staff. In almost all local communities the initial identification of goals and objectives has been the responsibility of a central staff to the mayor or county manager. An integrated system, if it is to perform as a system, points to central staff participation in the formulation of public service objectives. Classification of activities by purpose within the basic objectives similarly requires identification and grouping of all activities that serve a common objective even though the activities are administered by different agencies.

Qualifications of PPB as a tool—PPB cannot provide the answer to every question which an official may want answered before making a decision. Responsible decision making will continue to rest on political judgment. And it cannot deal with all government's problems. It does not address such problems as assessment of work efficiency, manpower selection, or administrative procedures.

PPB and analyses of costs and effectiveness of public programs can help by facilitating better decisions. The thrust of the system is to encourage a

conscious process of choice, supported by an adequate factual base. The productiveness of systematic analysis depends upon the policy maker who uses it, whether at the legislative or at the executive level.

In short, a developed PPB system will make better information available so that government may become not only more efficient but also more responsive to the needs and desires of the people.

II. "Learning" as a Product of Government

WE ASK IN THIS SECTION:

How may educational activities be grouped within a government-wide program structure in an integrated planning, programming, budgeting system? What are the key objectives of education? What are the purposes of specific programs carried out by school systems?

There is no "right" way of defining the "objectives" either of education or of school systems, but we have assumed "learning" as the central purpose of education and the schools.

Public education claims the largest single part of the civilian tax dollar. This priority is no accident; it reflects the importance society places on the unique learning capacity of people and on transmitting its values and stock of knowledge.

In what follows we show how the objective learning might fit into a program structure of government and then show within this objective a possible classification of programs which promote the many purposes of learning. In this way we display a framework within which to make more informed policy choices for education.

Products or services produced by government may be classified in accord with many differing themes. A jurisdiction may, for example, take as its major theme the development of man's potential as underscored in a statement by Professor Kenneth Boulding of University of Colorado:

> It must never be forgotten that the ultimate thing which any society is producing is people. All other things are intermediate goods, and all organizations are intermediate organizations. No matter how rich we are or how powerful we are, if we do not produce people who can at least begin to expand into the enormous potential of man, the society must be adjudged a failure.

Development of Man's Potential

The formulation of objectives and grouping of public programs in accord with a selected theme, such as "Development of Man's Potential," may be defined further by structuring programs in terms of the age groups in the population to which they are directed as shown in the following example:

Theme: Development of Man's Potential

I. Developing Children in Their Early Years
II. Developing Children and Youth
  A. Developing intellectual capacity

B. Maintaining and improving physical and emotional well-being
C. Maintaining and improving family environment
D. Maintaining and improving neighborhood environment
E. Correcting malbehavior and protecting the public

III. Realizing the Potential of Working-Age Groups
IV. Realizing the Potential of the Aged
V. General Support and Administration

We have listed a few illustrative classes of program objectives within the category, "Developing Children and Youth," the primary age group for whom formal education is carried out; for other age groups in the population, similar subcategories are called for in elaborating the range of programs of governments.

Public Investment for Economic Growth

Another formulation of a central theme is that of public investment for economic growth in which the range of public investment is set forth in accord with the various factors contributing to such growth, including human resources, physical capital resources, and natural resources. All government activities might be grouped as follows:

Theme: Public Investment for Economic Growth

I. Investment in Human Resources
A. Health
B. Learning
II. Economic Growth—Industrial Supports
III. National Resource Conservation and Development
IV. Promotion of Community Development
V. Environmental Improvements and Safeguards
VI. General Administration and Support

In this grouping, learning is one of two major products that contribute to human resource investment as a source of economic growth; good health is the other. Because of the importance of economic growth to the over-all resources available for public and private use and enjoyment, emphasis is frequently placed on investment, both in people and in things. Education's major role as a source of growth is now widely accepted. Much weight is given to this investment role in designing educational programs.

Consumer Services

Still another illustrative theme views governmental services as a series of consumer goods. In fact, the application of the processes of a planning, programming, budgeting system to government is intended to provide analyses of goods that are comparable to the consumer's evaluation of his options for spending his funds. The context of application of the processes of the system to alternative use of resources tends to emphasize this consumer services theme.

Learning in this context is basically a consumer good which society purchases collectively with its taxes, rather than purchasing it on an individual basis in the market place.

Theme: Fundamental Public Consumer Services

I. Personal Safety
II. Health
III. Learning
IV. Satisfactory Home and Community Environment

V. Economic Satisfaction and Employment Opportunities
VI. Satisfactory Leisure-Time Opportunities
VII. Transportation-Communication-Location
VIII. General Administration and Support

We have not shown subcategories for the learning objective in this array of public goods. The subcategories are displayed, however, in a subsequent section of this paper.

Products of the School System

Thus far the illustrations have been confined to showing the purpose, learning, in accord with various themes for grouping governmental programs by basic objectives. We turn now to the second question, namely, the products of the school system.

Learning is surely the most important but not the sole product of the school system. How about the other services which a school provides? How might school health, lunch, community programs, and traffic controls be shown in such a structure? In short, how do we show the non-learning outputs of the school system in a program structure for the whole of government?

The illustration below shows how one might array these non-learning functions of schools by the final objective which each promotes. We have taken as a starting point of the program structure the first seven categories of the Public Consumer Services theme displayed above. The school may contribute to personal safety through provision of civil defense facilities, school safety patrols, and assistance to law enforcement agencies; the school may contribute to health through control of infectious diseases, school nursing, health screening, and school treatment programs; etc. Under Item III would be found the chief outputs of schools which for reasons of simplification we delay discussing to the following pages which develop the activities and outputs related to learning.

The Program Outputs of Schools

I. Personal Safety (Protection from Personal Harm and Property Loss)
  - Community civil defense facilities
  - Safety patrols
  - Assistance to law enforcement agencies

II. Health (Physical and Mental Well-Being)
  - Control of infectious and contagious disease
  - School nursing
  - Health screening programs
  - School treatment programs

III. Learning
  - (Basic mission)

IV. Satisfactory Home and Community Environment
  - Schools as a community facility
  - Intra-community relations

V. Economic Satisfaction and Employment Opportunities
  - School welfare programs (clothing distribution, etc.)
  - School meals programs
  - Career opportunities (included essentially in III above)
  - School-work programs (included essentially in III above)

VI. Satisfactory Leisure-Time Opportunities
  - Recreational services

VII. Transportation-Communication-Location
Traffic controls
School transportation facilities

Classifying Learning Outputs

For convenience of discussion two routes to learning may be distinguished: experience and education. Education in turn is carried out informally through public communication and family and other personal relationships and formally through the school program. Since we are concerned here primarily with outputs of a public service, namely, educational services, we shall concentrate on the latter. However, we must be mindful that throughout life, experience will complement and often substitute for the learning processes of formal education. We have tried to illustrate this relationship on Chart 1 where the word *experience* is placed in a box with dotted sides. We have also shown informal education processes in the same way.

The chart shows how learning as one of the basic outputs of government fits into the consumer services theme above. It distinguishes the learning services provided to different age groups.

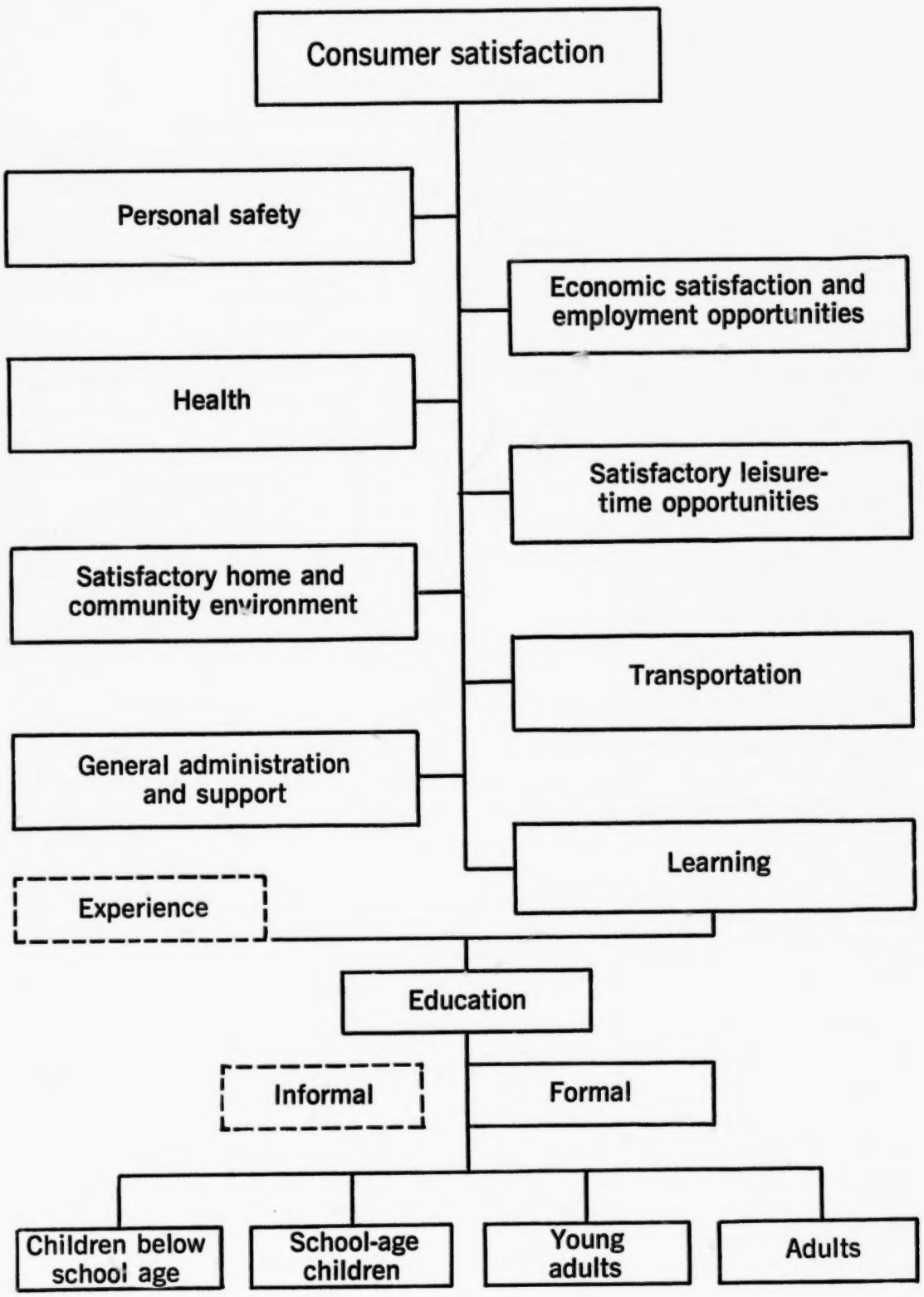
In Chart 2, "Learning Through Formal Education" is subclassified further to group all the activities undertaken to achieve a learning product, according to three major types of learning that are being sought: (a) the development of basic skills, (b) the development of moral and social skills, and (c) the development of individual fulfillment skills. Educational activities directed to school-age children and youth can be divided into these three categories, each descriptive of fundamental objectives.

The basic skills on the left are those skills necessary to the development of children and youth into independent and self-sufficient persons. In addition to skills involved in caring for one's physical self there are the language arts, computational, and reasoning skills basic to economic independence capped off by specific employment skills. In the center box are "Moral and Social Skills" through the acquisition of which the individual is prepared for living with others, in the family, in small groups, and in society. Finally on the right are "Individual Fulfillment Skills" through which the individual gains the intellectual experience and training that will permit him to identify and realize his own potential. Included within this range of skills are those services that permit an individual to receive advice and counseling that will buttress through information his ability to choose, and to acquire the necessary learning.

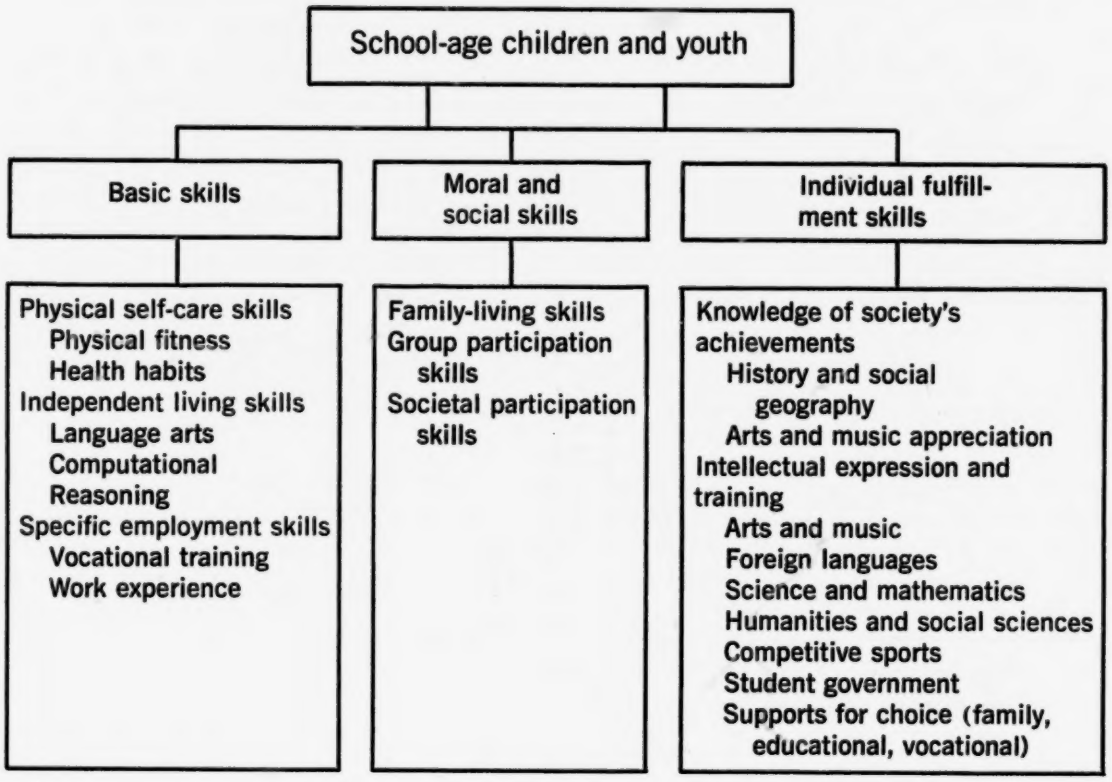
Further Classification

The special services required to promote learning of (a) basic skills, (b) moral and social skills, and (c) skills leading to individual fulfillment among groups of children would be identified within a program structure. Such identification helps to flag the multiple layers of objectives that are being pursued, partly in the interest of efficiency and effectiveness, and partly out of concern for fairness or equity in distribution of public funds. The distinguishing of the categories presented in Chart 3 is *not* intended necessarily to suggest the desirability of separate programs for each of the groups but rather to list the target groups of children for whom services need to be considered and evaluated. Further subcategories would be intro-

1. Program Categories Display



2. Learning Through Formal Education



duced in practice in evaluating the services; for example, groups of mentally retarded would be divided showing those that are educable; children from low-income families, rural or urban, would be classified to identify those from Spanish-speaking families, from American Indian families, and Negro and other ethnic groups.

Learning in an Output Oriented Program Structure

A composite of the illustrative categories that have been discussed is shown in Chart 4. This chart combines in a single display the program categories and subcategories set forth earlier, and also indicates that interrelationships between selected public services have to be considered because together they contribute to achieving a single public objective.

We have carried through as an illustration the classification of a portion of a program structure—that part oriented to the product learning. In the preparation of such a structure each of the categories would need definition so that expenditures made for each product could be identified and recorded. The format, moreover, provides the basis for displaying projected outputs and the costs that would be incurred in achieving them for a period of time ahead.

There is no tidy and precise way to sort out where each specific activity that is undertaken in carrying out a

set of objectives belongs within a program structure. Activities and the expenditures made in carrying them out frequently may be grouped under more than one category. The need for definition is thus underscored.

An Example of a Program Descriptive Statement

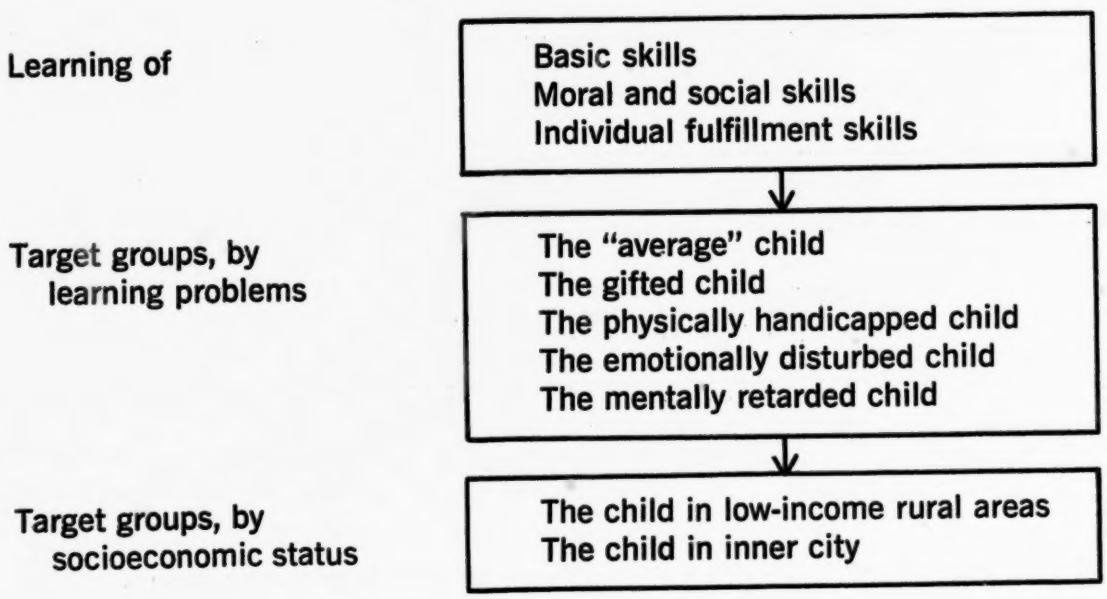
To provide an example of an outline of a descriptive statement on objectives and definitions of educational services, we have followed through on the illustration given earlier. While the outline is not as comprehensive as would be needed for a fully operative programming system, it does serve to show the kinds of information that would be displayed for the public officials. Chart 5 presents this example in a highly summarized form on pages 21-24.

Summary

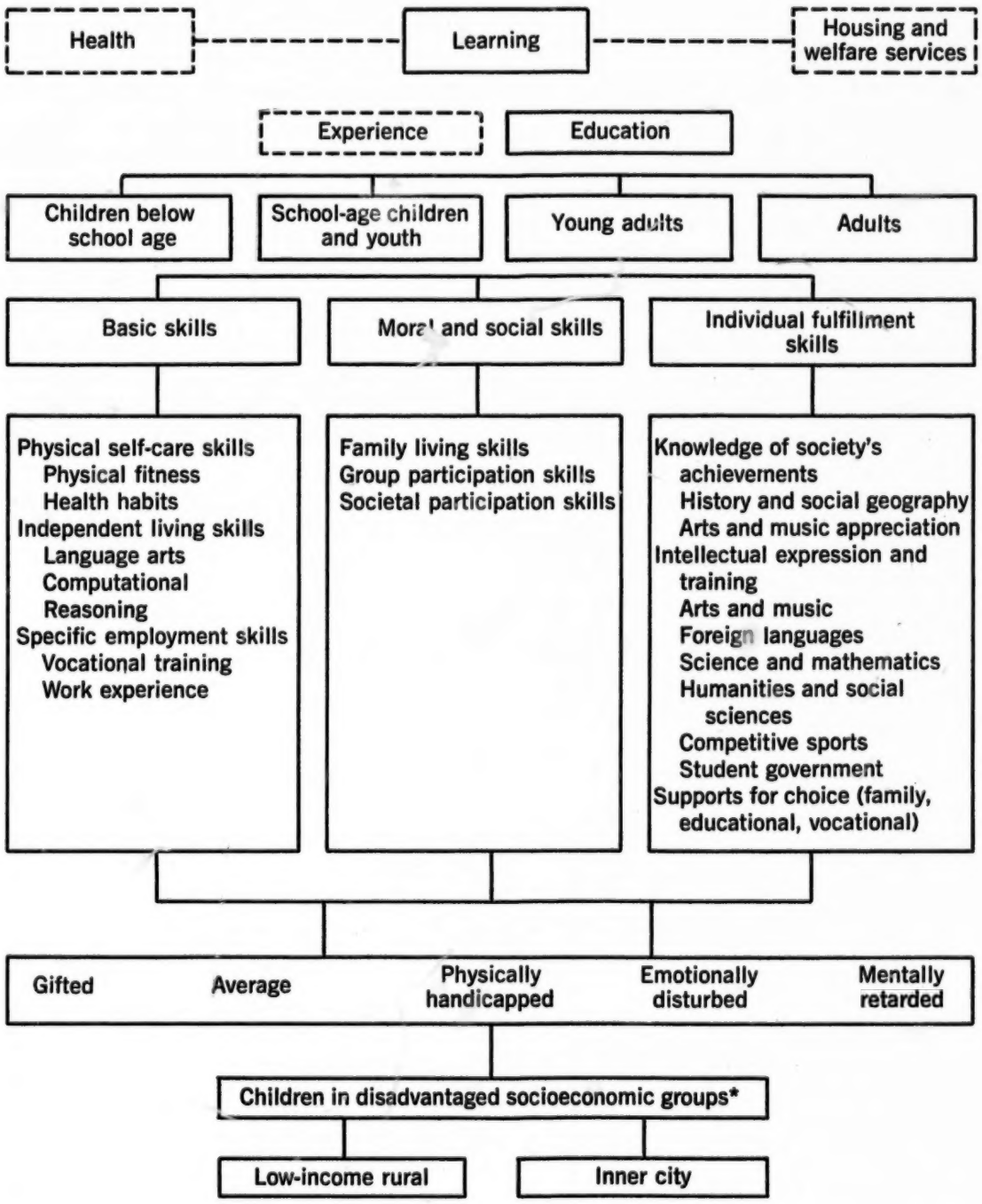
We have tried in this section to present various ways in which the broader purposes of governments may be classified in terms of their objectives, indicating first how learning, the objective we have selected to emphasize, might fit into a program structure for government. We have also attempted to show by example how the activities of the school system would be grouped within a government-wide program structure. We have elaborated further the groupings of various activities that contribute to learning, distinguishing in general three types of learning products that are sought and the types of activities that contribute to each.

The information that would be presented in this type of display for pur-

3. Target Groups Identified



4. Learning in an "Output" Oriented Program Structure



* These groupings are not intended to represent separate activities but to flag groups that should be considered in evaluation of program options.

poses of illuminating the program decisions taken and funds requested is by itself a significant forward step. In making the selection to illustrate product orientation, we were not unmindful that funds generally are not budgeted in terms of activities as we have outlined them, nor are we unmindful of the fact that educational expenditures are not routinely accounted for in these ways. New estimates would be needed in order to quantify the resources devoted to each activity category shown.

It needs to be emphasized in conclusion, however, that the classification or grouping of educational activities depends on objectives.

5. Objectives and Definitions of Educational Services

DEVELOPMENT OF BASIC SKILLS

Objective: Sequential Development of independent and self-sufficient persons through educational levels

Definition: Activities that contribute directly to developing capacity needed for independent existence

Skills in caring for one's physical self

Objective: To prepare the individual for self-sufficiency

Definition: Activities that enhance the individual's competence to take care of himself

- Physical fitness skills
  - Physical education
- Health habit skills
  - Health screening (hearing, mental retardation, sight)
  - Referrals and case follow-ups
  - Health education
  - First aid and life-saving instruction
  - Personal hygiene instruction
  - Sex education
  - Instruction in dangers of tobacco, alcohol, and narcotics

Skills basic to independent living

Objective: To develop the general skills that are pre-conditions for employment

Definition: Activities that sequentially develop basic skills for independent living

- Language skills
  - Reading instruction:
    - English as a second language (when necessary)
    - Tutorial and remedial reading (when necessary)
  - Spelling

Elements of English courses
Oral expression
Grammar
Composition
Debate
Computational skills
Arithmetic operations
Non-whole numbers—decimals, fractions
Basic applied mathematics
Reasoning skills
Introductory natural sciences
Basic behavioral sciences
Introductory abstract reasoning—algebra, geometry
Syllogism as dealt with in English courses

Skills basic to specific employment

Objective: To prepare the individual for specific employment

Definition: Activities that develop special competencies for employment

Vocational skills development
Vocational shops
Business courses
Technical courses
Occupational training for groups with special health problems (retarded, physically disabled, etc.)
Work experience development
Apprenticeships
On-the-job training
Neighborhood Youth Corps
School-work release

SOCIAL AND MORAL SKILLS

Objective: To transmit society's fundamental values in order to facilitate group living

Definition: Activities that provide group living experience; that transmit knowledge of behavior required for inter-personal and inter-community adjustment; that give a sense of moral values to the individual; that check amoral and anti-social behavior

Family living skills

Objective: To transmit concepts of family living

Definition: Activities that reinforce the general pattern of home life and that provide a basis for acquiring group participation skills

Homemaking
Opportunities for one-to-one personal working and play relationships

Group participation skills

Objective: To transmit moral precepts and concepts of group participation

Definition: Activities that involve instruction and experience meant to facilitate group participation and individual functioning within groups

- Play and other group recreation
- School social activities
- Racial relations programs
- Clubs and other quasi-formal groups

Societal participation skills

Objective: To develop a knowledge and appreciation of the societal environment and how to participate in it

Definition: Activities that are intended to expose the individual to his societal environment and to promote his participation in it

- Civics
- Geography
- History—American and general
- Student government
- Trips to observe governmental activities
- Speakers representing government and community organizations

INDIVIDUAL FULFILLMENT SKILLS

Objective: To achieve awareness of the range of human endeavor and gain full self-realization

Definition: Activities designed to develop the individual's understanding of society's achievements and appreciation of himself, his capacities and competencies, and to motivate him and give him the opportunity for self-development

Knowledge of society's achievements

Objective: To achieve an awareness of the range of human endeavor and its development

Definition: Activities that transmit a knowledge and awareness of the achievements of mankind and the importance of thought and creativity

- General study of:
  - History
  - Social geography
  - Arts and music appreciation
    - Attendance at art and music events

Intellectual expression and training

Objective: To draw out and broaden individual capacity and talents

Definition: Activities that (a) enrich the regular school program, (b) provide opportunities for creative expression and for elevating the dignity of the individual, and (c) develop leadership talents

- Arts and music (including performing arts)
  - Dance—ballet, folk dance, etc.
  - Drawing, etc.
  - Creative writing
  - Music performing
  - Crafts and design
- Foreign languages
- Intermediate and advanced science
  - Science and mathematics
  - Science competitions
  - Naturalist field trips
- Intermediate and advanced humanities and social sciences
  - Advanced social science, sociology, economics
  - Advanced humanities, advanced literature
- Competitive sports
  - Interschool sports
  - Intramural extracurricular sports (activity included in another category)
- Student government (activity included in another category)
  - Formalized institutional structures to allow students to participate and lead in student self-government as contrasted to social, recreational, and academic-interest club activities

Supports for individual choice

Objective: To provide information and aid to the individual and his parents to permit better choice of school program and of post-high-school opportunity that accords with capabilities

Definition: Activities that provide counseling, testing, and guidance and that enhance and support the capacity of the individual to attain self-realization

- General pupil testing; testing of pupils with special problems; testing of teaching methods
- Guidance for choice among courses, among colleges, and among vocations
- Guidance and counseling of the family
- Psychiatric or clinical psychological guidance and counseling
- "College discovery"

III. Cost-Effectiveness Analyses for Learning

IN THE USE OF LIMITED tax funds, educators, legislators, and elected officials are faced with choosing among programs. Analysis provides information comparing the cost and effectiveness of the several alternative programs. The questions: Why? What? Where? How? For whom? and When? can be clarified and given specificity by careful analysis.

Educational problems that could be illuminated run the gamut from detailed questions to the broad issues of compensatory public education for slum children and for other disadvantaged groups. Analysis may shed light on the question: Where should we locate the new school facility? Or, How should an educational facility be designed to facilitate learning? It would yield more and better information to facilitate choices in scientific instruments or learning devices. At the other extreme, analysis may be directed to such broad policy issues as: What should comprise the school year? How should education be financed?

While analysis of programs is central to the carrying out of a planning, programming, budgeting system, the evaluation and analysis of educational programs may be undertaken with advantage whether or not such analysis is part of an integrated planning, programming, and budgeting system.

The concepts of analysis and evaluation are hardly new to those concerned with education. It is somewhat of a departure, however, that in recent federal legislation the U.S. Congress has specified evaluation as a condition of aid. Congress requires evaluation of educational programs of both the Office of Economic Opportunity and the Department of Health, Education, and Welfare "in order that cognizance may be taken of desirable changes which should be made in future perfecting legislation." This is an active role in policy questioning for the nation's number one legislative body. It is a role that will probably become increasingly important in all federal grant-in-aid legislation. For example, Title I of the Elementary and Secondary Education Act of 1965 requires "provision for approved objective measurements of educational achievement . . . for evaluating at least annually the effectiveness of the program in meeting the special educational needs of educationally deprived children."

Impetus is thus given to legislative requests for evaluation of educational projects and their funding. Such evaluations will yield a body of information of great value for analysis of program options.

What Is Analysis?

Analysis, as defined more specifically in the paragraphs below, is a process of systematically asking relevant questions about full cost implications and benefits of program alternatives to satisfy objectives and assembling information that bears on those questions. The questioning starts by defining program purposes or objectives and by asking what alternative courses may be followed in meeting those objectives. Analysis calls for estimating costs and gains in meeting those purposes by alternative programs. It calls for inquiring about the uncertainty of those esti-

mates. It calls for documentation of the information that is brought together to give greater precision to the "pros and cons" (gains and costs) of alternatives for meeting stated objectives by quantified description where possible and to qualitative statements where quantification is not possible.

The question and objectives—Specifically, analysis addresses itself first to: Are we asking the right question in terms of our objectives or purposes when we ask, for example, What services are available in a community for linotype training? Should we ask instead, Are young persons finding jobs in the fields for which they are trained? Or are we addressing the right question when we ask, How can we achieve a standard of 25 pupils per teacher? Instead in terms of our purposes we might ask, How best can we achieve the learning products we seek in our school system?

By systematically attempting to identify the underlying purposes of education and the schools, a framework is set for the development and the documentation of relevant information that can aid in sharpening the issues for decision and in identifying the component considerations, including cost implications and likely consequences in satisfying the purposes sought.

Alternatives—Analysis calls for a search for alternative ways of meeting the defined objectives, a questioning: What are the options? What can be done in place of what we are now doing? A questioning process on options systematically carried out yields a range of possibilities for examination as to costs and gains.

Through the search for alternatives there is developed a built-in framework for social invention. A frequent criticism of government is that it is slow to accept new ideas. The educational community, among other groups carrying responsibility for public services, has frequently been charged with a lack of receptivity to new ideas. Adoption of analytical methods that routinely call for imaginative creation of new programs and program options should help to overcome this lethargy.

The product of analysis, with its emphasis on alternatives, would confront policy officials with a different kind of decision. In place of the familiar Yes or No response to specific proposals, a range of choices would be provided, both in terms of activities and in ways of carrying them out to achieve defined objectives. Thus, analysis may mean a more difficult decision, since it does not present merely a Yes or No choice.

Documentation—Analysis means documentation, that is, a written statement on what is used as data, what is assumed, what logical sequence is followed in the reasoning. The sources and meaning of statistics that are drawn upon would be set forth. Major assumptions that are made to simplify the study would be set forth in detail. The logical sequence that is followed in arriving at the formulation of the content of the study would be displayed. Limitations, uncertainties, and factors not considered would be clearly identified.

Such documentation permits others to review and understand what has been done. For those public officials who are especially concerned with any policy question or public issue, the documents prepared provide a basis for careful examination of the detailed materials that underlie summary statements of choices for action.

Costs and gains—Analysis calls for two basic sets of information once ob-

jectives have been specified and the questions have been defined: (a) information on costs of programs that represent alternative ways of meeting objectives, and (b) information on outputs or effectiveness relative to the objectives of various program or activity options.

The information that needs to be brought together on costs and effectiveness occurs on three levels:

1. Cost and effectiveness in a given current period for each level of the program
2. Future cost and effectiveness implications of present programs and alternatives for each level of the program
3. Changes in cost and effectiveness that accompany changes in level of volume or quality of services provided, both current and future periods.

Program Costs in Alternatives

Costing of public services and projecting costs for a future period are the more familiar components of the information that is brought together as part of an analysis.

For costing purposes we need to know the total estimated cost of each program alternative that is being considered, both initial cost and expenditures that are implicit for the future at the levels of services being examined. For example, the current level of provision of kindergarten services would have to be priced out for the changing number of 5-year-olds and kindergarten services for a half-day session and a full-day session, both for the present number of 5-year-olds and the changing number expected.

Total costs include expenditures for personnel, such as salaries and wages and fringe benefits. They include directly identified costs associated with an activity and that part of overhead that appropriately may be assigned to it. Building costs, equipment costs, and supplies that would be involved in the various program alternatives would be estimated whether borne by the schools or by some other agency. Costs borne by general revenues of the jurisdiction would be identified as well as costs borne by grants and by other taxing jurisdictions.

We also need to know, however, which costs involved in the activity being considered are fixed and accordingly would not change because of changes in level of activity and which costs are variable (i.e., costs that respond to alternations in quantity or quality of service). Such a separation provides the base for estimation of how costs would be modified, or what the marginal cost effect would be, by greater or lesser production of the services.

The work that has been done over the years in developing the manual for educational accounts and the use of such accounts by the U.S. Office of Education for statistical reporting provide an important take-off point for most analyses. However, expenditure accounts specified in the manual do not necessarily yield the total cost data needed for examining in depth the cost of particular optional activities. Nor is it necessary that accounting records and definitions be revised. It would be sufficient to prorate expenditures as recorded for accounting purposes to derive cost estimates. These prorations can be made in accord with reasonable allocation indexes designed to allocate expenditures among purposes. While this procedure would lack the precision of detailed accounts, it would provide

adequate information for program analyses. Margins of error are tolerable. The major consideration is whether in arraying alternative methods of getting a task done the figures are comparable from program option to program option.

Measuring Effectiveness

Measurement of gains, benefits, or effectiveness that would be achieved by each of the alternate ways of satisfying the specified objective are far less familiar. Much of the discussion that follows is accordingly addressed to: How does one measure the effectiveness of an educational activity?

In private industry, product output is a relatively simple thing to determine. The output of a car manufacturer consists of the number of motor vehicles of various types produced—trucks, buses, passenger automobiles. For public goods and services, including education, indicators of progress or units of output have not received much attention heretofore. Recent efforts at evaluation of public programs and services give a new significance to output measurement.

Professor Jesse Burkhead, in his studies on educational expenditures, has illustrated in summary form the production process of education in a

6. Input, Process, and Output Variables in the Educational Process

INPUT VARIABLES (Land, labor, capital)	PROCESS VARIABLES (Current expenditure policies)	OUTPUT VARIABLES (Benefits to the individual and society)
Student time in the classroom at home extracurricular	Class size	Increased intellectual curiosity
	Size of the school	Social adaptation
Personnel time administrative teaching clerical maintenance auxiliary	Teacher-pupil ratio	Development of creativity
	Ratio of administrative and clerical personnel to students	Increase in skills and earning ability
Materials and supplies	Use of personnel for guidance for remedial instruction	Increased lifetime earnings
Buildings and equipment		Growth of informed electorate
		Increased national growth

Source: Burkhead, Jesse. "A New Way To View the Educational Process." *Education in the States.* Washington, D.C.: National Committee for Support of the Public Schools, 1966. p. 29.

manner somewhat analogous to that of industry. He shows the interplay of inputs and outputs as shown in Chart 6. This illustration, as Professor Burkhead emphasizes, does not identify the whole range of possible variables in inputs, in process, and in outputs.

The measures we seek are those that can quantify how well we are meeting specified objectives. This quantification, in turn, requires new concepts of measurement. Though the aims of education may be hard to quantify, so are other of our basic aims. In our democratic society we hold freedom dear, yet measurements of freedom have by and large not been developed. We have established institutions, our court system, for example, to assure our basic democratic rights, but we do not have measures of how effectively the courts and the governmental system as a whole are protecting those rights. The illustration of freedom is cited to suggest that the problems of defining measures of effectiveness for education, while difficult, are not unique.

What determines the yardstick that is used to assess whether satisfactory progress toward the achievement of objectives is being made? Several characteristics of such yardsticks need emphasis. The first of these clearly is the relevance of the measure to both the objective and the activity. The second is the completeness of the measurement, that is, the indicators of progress in combination should quantify all significant effects of an activity. A further characteristic is to promote simplicity as long as the indexes encompass the major program accomplishments. However, as we might expect, the availability of information and the potential for collecting new data will affect the indicators used.

Objectives and criteria of evaluation—Clearly the measures selected are determined by the objective of the activity or program. Assume, for example, that as the sole but still vaguely defined objective of the school system, "equality of economic opportunity" had been selected. This vaguely stated objective may be given greater specificity in a number of ways. For illustrative purposes, again to indicate the relation between the selection of product measures and objective, we might reformulate the objective of equality of economic opportunity in operational terms as achieving completion of a 12th grade level of education for all young persons. (At this level, the research of Professor Richard S. Eckhaus of MIT suggests individuals qualify for all but 10 percent of the jobs in the economy.[2]) The most direct measure of output would then become the number and proportion of persons satisfactorily achieving the defined high-school program. The definition of the program would be set in terms of basic requirements for all but 10 percent of job opportunities. An educational program would be more effective the closer it came to achieving high-school completion for 100 percent of each school generation. With this limited statement of the objective, other educational activities, such as the objective of college preparatory work, would not be considered, nor would any other educational product that is not job related.

Multiple purposes and multiple measures—Education as suggested by the outputs listed in Chart 1 serves multiple objectives and thereby calls for multiple indicators of progress

[2] Eckhaus, Richard S. "Economic Criteria for Education and Training." *Review of Economics and Statistics,* May 1964.

toward meeting those objectives. The chart displays benefits to the individual and to society. It includes variables that measure current effects, and those that measure long-range consequences. The selection of variables from among the multiple possibilities again depends upon the objectives that are given emphasis by the public officials in a community or state.

Multiple indicators for single purposes—Even within a single defined objective, adequate measurement of effectiveness may require the development and use of multiple indicators.

Elsewhere we identified for illustrative purposes "the achievement of learning" as a central objective of education. This learning product, in turn, was classified into (a) learning of basic skills, (b) learning of moral and social skills, and (c) learning skills for individual fulfillment. For these subcategories and their component elements, a number of indicators of output are shown in Chart 7. The chart follows an illustrative program structure. The indicators shown also are illustrative, but generally feasible in the present state of the art of testing. While not all school districts or educational departments have readily at hand the information that is called for by those indicators, the data could be collected.

The newness of undertaking to analyze programs in terms of their product and effectiveness will necessarily require collection of new data. It will also require for some programs the development of new concepts for data collection. For example, the illustrative indicators shown include achievement and attitudinal measures that are feasible with present testing instruments, but are not used in many places. To improve the illustrative indicators new tests would have to be designed.

In some cases more than one indicator is listed for a single activity in measuring the progress toward satisfying the objective. In selecting indicators it is possible to use so many that the decision-making process will be overloaded. At the other extreme, important products (negative as well as beneficial) can be overlooked.

Matching "effectiveness" and activity—Measures or indicators of effectiveness necessarily must be selected so that they are appropriate for the activity or program that is being analyzed. At the same time, however, the measuring rods should provide information on the relation of the activity to the broader purpose served. Just as the categories of a program structure display elements and subgrouping of programs that are product oriented, so the measurements of the output will be more or less detailed as indicated in Chart 7.

We have grouped counseling activities, for example, on this chart as one of several types of counseling that have the purpose of giving support to the individual in choosing school programs and post-high-school opportunities appropriate to developing his own capabilities fully. How may we measure the product of family counseling in facilitating the full development of an individual's capability? The number of children and their parents given counseling services is one possible indicator of the volume of activity. Another might be the closely related measure of the number of children referred to and "followed through" family counseling services. Clearly volume of services is an inferior indicator to such measures as school achievement, or work satisfaction and so forth. But counseling often

involves a long period before its results can be assessed even when a direct relationship can be established between achievement and family counseling. To come closer to measuring the product, it may be possible to gather information on diagnosis and prognosis by time intervals of cases referred for family counseling services and to separate out and measure differences in individual adjustments and use of capacity between "before" and "after" services, in cases that are amenable to substantial improvement in a relatively short period. It may also be possible to conduct a controlled experiment to obtain information on the differences between "services" and "no services" in a short period. On examination it may be found that a short-term indicator would tend to bias the evaluation for a number of reasons, both in terms of cost and in terms of effectiveness of program, so that other measures of effectiveness would have to be developed. The purpose of this example is merely to illustrate the process of indicator selection.

Effectiveness for target groups—Educational services, often provided under state constitutions that guarantee the right of all children to education, require a careful assessment both of "equality of opportunity" and of fulfilling individual promise for groups of children varying in such characteristics as age, sex, family income, location, physical condition, and intellectual ability.

While objectives may be defined in the same way for all children, alternative programs may have different effects in yielding learning of (a) basic skills, (b) moral and social skills, and (c) self-fulfillment skills, depending upon the intellectual and physical condition of the child and his socioeconomic group.

At this time two groups of children of school age are of particular governmental concern: (a) children in core cities and in poor rural communities for whom compensatory educational services are needed in order to achieve the learning objectives sought and (b) gifted children in and out of core cities on whose full intellectual development depends the quality of the population needed to gain the scientific and technological advances that may compensate for our nation's smaller number of people in the world political scene. Thus, the measures used can be directed to assess effectiveness for target groups; for example, test achievement scores might be provided by sex, economic group, and so forth.

Monetary measures of effectiveness—While the additional earnings that accrue to those who complete high school have become a familiar indicator of education's product, our emphasis is on non-monetary outputs. These non-monetary outputs are more in accord with the central objective "learning" used for illustrative purpose in this pamphlet. We decided to emphasize these non-monetary measures for the following additional reasons:

1. The translation of educational benefits into dollars has become too ready an approach to the effectiveness of education.

2. Activities that make up the overall educational program require more specific measures of effectiveness than are provided by the dollar additions to earnings.

3. Education produces current "value" for children and their parents that is not measured by future increments to earnings. (It must be borne in mind that more than one-fourth of a person's life expectancy—now 66.8

(*Continued on page 38*)

7. Illustrative Program Structure and Output Indicators

PROGRAM SUBCATEGORIES AND ACTIVITIES	OBJECTIVES	INDICATORS
EDUCATIONAL DEVELOPMENT		
DEVELOPMENT OF CHILDREN BELOW SCHOOL AGE		
EDUCATION FOR SCHOOL-AGE CHILDREN AND YOUTH	To develop human learning capability	Number of young persons receiving educational services Results of achievement progress testing Results of measures of attitude change
Development of Basic Skills	Sequential development of independent and self-sufficient persons, through educational levels	Percent of persons equipped for independent living Number not dependent on public or private charity Number employed, attending college, etc.
Skills in caring for one's physical self	To prepare the individual for self-sufficiency	
Physical fitness skills	To develop strength and coordination and to provide an outlet for physical energy	Number and percent of children participating in physical education Number and percent of children meeting specified physical standards

Health habit skills	To reduce health impediments to self-sufficiency and learning and to provide knowledge of detriments to health and physical well being	Number and percent of children with standard specified health habits, e.g., tooth brushing Number and percent of children with knowledge about the effects of tobacco, alcohol, and narcotics Number and percent of children receiving sex education and knowledge of family planning
Skills basic to independent living	To develop the general skills that are preconditions for employment	Achievement test scores: overall Number and percent at grade level Number and percent exceeding grade level Reduction in the percent not achieving at grade level
Language skills	To develop capacity for communication and intellectual advance	Achievement test scores: reading, spelling, and expression Number and percent at grade level Number and percent exceeding grade level Reduction in the percent not achieving at grade level
Computational skills	To develop capacity to deal with numbers and symbols in daily and work life	Achievement test scores: Number and percent at grade level Number and percent exceeding grade level Reduction in the percent not achieving at grade level

Reasoning skills	To develop capacity for solving practical problems, for interpreting instructions, and for stimulating reasoning	Achievement test scores: Number and percent at grade level Number and percent exceeding grade level Reduction in the percent not achieving at grade level
Skills basic to specific employment	To prepare the individual for specific employment	Skills achievement tests: Number and percent of graduates having skill level Number and percent exceeding skill level Reduction in the percent not achieving at skill level
Vocational skills development	To prepare the individual for specific employment	Number of dropouts Number of graduates Percent in jobs after a certain period of time Percent enrolled in colleges and universities
Work experience development	To prepare the individual for specific employment	Number of dropouts Number of graduates Percent in jobs after a certain period of time Percent enrolled in colleges and universities
Social and Moral Skills	To transmit society's fundamental values in order to facilitate group living	Crime rates Juvenile delinquency rates Divorce rates Births to unwed mothers Indicators of tolerance of minority

		groups, religious and race differences Voluntary compliance with specific public programs
Family living skills	To transmit concepts of family living	Sociometric indicators Percent participating in specific homemaker programs
Group participation skills	To transmit moral precepts and concepts of group participation	Percent participating in youth activity groups Percent holding prevailing moral beliefs Percent acting in accord with prevailing social and moral precepts Changes in age-specific crime rates Number and percent participating in extracurricular school activities Number and percent participating in organized recreational and sports activities Number and percent participating in community outdoor and other recreational activities
Societal participation skills	To develop a knowledge and appreciation of the societal environment and how to participate in it	Achievement test scores in social sciences Number and percent at grade level Number and percent exceeding grade level Reduction in the percent not achieving at grade level

		Percent of student body voting in school elections
		Reduction in the number of offenders and of recidivists
		Change in delinquency rates
Individual Fulfillment Skills	To achieve awareness of the range of human endeavor and gain full self-realization	Attitudes toward "self" and tests of information
Knowledge of society's achievements	To achieve an awareness of the range of human endeavor and its development	Measured knowledge of a variety of disciplines
Study of history	To achieve an awareness of political, cultural, and social development	Measured knowledge of history
Study of geography	To achieve an awareness of political, cultural, and social development	Measured knowledge of social geography
Arts and music appreciation	To achieve an awareness and understanding of arts and music	Measured knowledge of arts and music
Intellectual expression and training	To draw out and broaden individual capacity and talents	Number and percent participating in intellectual activities
Arts and music (including performing arts)	To ferret out and develop talent in the arts	Number and percent participating in art activities
		Measured achievements relative to aptitudes
		Number of prizes and awards
Foreign languages	To ferret out and develop ability in foreign language	Number and percent participating in foreign language
		Measured achievements relative to aptitudes
		Number of prizes and awards

Intermediate and advanced science and mathematics	To ferret out and develop ability in science	Number and percent participating in intermediate and advanced sciences Number and percent participating in advanced mathematics Measured achievements relative to aptitudes Number of prizes and awards
Intermediate and advanced humanities and social sciences	To ferret out and develop ability in other special programs To make programs selectively available in terms of child's interest and capability	Number and percent participating in intermediate and advanced humanities and social science Measured achievements relative to aptitudes Number of prizes and awards
Competitive sports	To ferret out and develop athletic ability	Number and percent participating Measured achievements relative to aptitudes Number of prizes and awards
(Student government)	(To develop leadership talents)	Number and percent participating Measured achievements relative to aptitudes Number of prizes and awards
Supports for individual choice (family, educational, vocational)	To provide information and aid to the individual and his parents to permit better choice of school program and of post-high-school opportunity that accords with capabilities	Percent of students using services Percent of families aided Change in separations and divorces Change in school performance of child Percent of graduates admitted to college Percent of graduates continuing for a complete college program

years for males at birth—is the period of childhood.)

4. Population mobility frequently creates benefits or returns from a full period of preparatory education in places other than the communities in which educational services were received by an individual.

5. Educational programs serve multiple purposes, and these purposes, especially as they concern different target groups, would not be displayed fully if combined in a single dollar measure.

In summary, the measure of added earnings does not sufficiently reflect the full benefits of learning.

Almost all the non-monetary indicators could be translated in one way or another by assigning what is termed "shadow prices" or some monetary value. For example, an estimate might be developed of what parents would be willing to spend to have Johnny move from grade 4 to grade 5.

There are, however, types of measures of effectiveness appropriate to the objective selected that can readily and appropriately be put forth in dollar terms. We have already indicated the increments to earnings criterion which is applied frequently. There are other monetary measures such as the reduction in cost of noneducational public services as a consequence of "learning." These may include savings in expenditures for welfare, juvenile delinquency, health, and so forth.

Relating Costs and Effectiveness

Analysis of programs concerns itself with relating the cost of various optional means of achieving an objective to the gains or output which are indicated by the values estimated for the measure of effectiveness. Dollar changes in cost for each alternative program mix and level, when arrayed against the changes in effectiveness, provide the skeletal format for analyzing programs or activities. In an appended statement we present a hypothetical example of an analysis to show, at least in a partial way, the process and the kinds of information that would become available.

Qualification and Summary

Analysis of educational programs is clearly difficult because of the special characteristics of the services produced. Among these characteristics which make analysis difficult are:

1. The long gestation period of education outputs and the length of the necessarily sequential learning processes.

2. Our limited knowledge of the learning process which might hamper attempts to attribute a particular result to the actual activity which produced it.

3. The multiplicity of objectives in education which complicates the task of assigning a particular activity to the final educational purpose which it serves.

4. The difficulty of factoring out the effects of nonschool experiences on the process and product of learning.

Allocation of tax funds for education requires information on the relative effectiveness of alternative types of programs. They require costing of the various options. While frequently costs may be specified within a reasonable margin, prediction of effectiveness is often much more complex. Part of the difference lies in the familiarity of cost estimation, and the unfamiliarity of effectiveness quantification. As more work is done on program analysis and additional re-

sources are devoted to program evaluation and effectiveness measurement, the tasks of program analysis will become easier.

Even now efforts are being made to assemble the findings of earlier experimental studies that could provide a "data base" for prediction of the effectiveness of various educational programs and activities. New experimental studies with adequate controls are being undertaken. A substantial enlargement of the research and program evaluation effort is indicated. Program analysis, however, and generation of alternatives will likely remain a creative art rather than a science—a creative formulation of the "problem" and a creative development of means of attacking it.

Appendix: An Illustrative Example of the Process of Cost-Effectiveness Analysis

A BRIEF EXAMPLE is presented here to help clarify, at least in a summary way, the difference analysis would make in informational materials presented to those faced with decisions on public questions.*

For this example we selected child care (or supervisory) activities now peripheral to school operation in most communities. For simplicity's sake only, we do not consider any learning effects of these child care services. Our defined objectives of child care as an illustration, are (a) to give mothers more choice in satisfactory employment, and (b) to enhance family income.

In outlining the processes we (a) generate a series of optional programs, (b) formulate measures of progress toward satisfying the defined objective, (c) quantify the progress in terms of the measures of effectiveness, (d) assess the additional costs implied by the optional programs.

Program options—We consider several changes in school operations that

* The assistance of Brian Herman, Research Scientist, in developing this example is gratefully acknowledged.

TABLE 1.—CHARACTERISTICS OF CHILD-CARE PROGRAM OPTIONS

Program characteristics	Program options				
	I	II	III	IV	V
1. Hours of service.....	9 A.M.-3 P.M.	8 A.M.-6 P.M.	8 A.M.-6 P.M.	8 A.M.-6 P.M.	8 A.M.-6 P.M.
2. Weeks of service.....	40	40	52	40	52
3. Home health services	None	None	None	Range	Range

would broaden the choice of employment outside the home with its added money income for mothers. These include:

1. Lengthening the hours of school activities for children five years of age and over on an elective basis
2. In addition to lengthening the hours per day, extending the number of weeks of school activities from an assumed 40 weeks to 52 on an elective basis
3. During an extended day providing a range of home health services (practical nurse, home making, etc.) to care for the child who is temporarily ill, either for 40 weeks or 52 weeks.

Again for ease of presentation we do not consider programs other than child care that would facilitate a broadened choice of satisfactory employment for mothers, nor do we consider reducing below five years the age of children for whom child care activities might be provided.

We display in Table 1 the hypothetical characteristics of an assumed on-going program, and then vary the hours, weeks, and provision of home health services in several combinations to provide more supervised activities for the child of school age.

Program I is the assumed on-going program.

Program II is lengthening of the hours of school activities from 9 A.M.-3 P.M. to 8 A.M.-6 P.M. on an elective basis.

Program III is lengthening hours from 9 A.M.-3 P.M. to 8 A.M.-6 P.M. and in addition extending the weeks of school activities to 52 weeks, on an elective basis.

Program IV is a provision of school activities from 8 A.M.-6 P.M. and also health services, for the 40 weeks of the on-going school year.

TABLE 2.—ILLUSTRATIVE EMPLOYMENT EFFECT OF CHILD-CARE PROGRAM OPTIONS (NUMBER OF MOTHERS)

	Program options				
Mothers' employment status	I On-going program	II Added hours	III Added hours and weeks	IV Home health and added hours	V Home health and added hours and weeks
Remain at home	600	500	450	450	410
Are employed within hours 9 A.M.-6 P.M. only	100	50	40	70	60
Are employed within hours 8 A.M.-6 P.M. but not exclusively during 9 A.M.-3 P.M.	240	400	460	430	480
Are employed hours other than 8 A.M.-6 P.M.	60	50	50	50	50
Total	1,000	1,000	1,000	1,000	1,000
With improved choice	800	800	800	800	800
Without improved choice [a]	200	200	200	200	200

[a] Mothers with children below existing school age, or those not able to work outside the home.

TABLE 3.—ILLUSTRATIVE ADDED INCOME EFFECTS OF CHILD-CARE PROGRAM OPTIONS

Groups of mothers	Program options				
	I On-going program	II Added hours	III Added hours and weeks	IV Home health and added hours	V Home health and added hours and weeks
Newly employed mothers...	0	100 @ $2,000 = $200,000	150 @ $3,000 = $450,000	150 @ $2,600 = $390,000	190 @ $3,600 = $684,000
Mothers changing jobs	0	80 @ $1,000 = $ 80,000	100 @ $1,400 = $140,000	100 @ $1,200 = $120,000	120 @ $1,600 = $192,000
			Reduced private child-care costs		
Working mothers saved existing child care costs.....	0	50 @ $ 400 = $ 20,000	50 @ $ 500 = $ 25,000	50 @ $ 400 = $ 20,000	50 @ $ 500 = $ 25,000
Total	0	$300,000	$615,000	$530,000	$901,000

NOTE: In each case the estimated number of women affected is multiplied by the estimated increase in earnings or by saving in estimated existing child-care costs.

TABLE 4.—ILLUSTRATIVE NUMBER OF PUPILS BELONGING TO MOTHERS IN EACH EMPLOYMENT CATEGORY (A COST WORK SHEET)

Mothers' employment status	Program options				
	I	II	III	IV	V
	On-going program	Added hours	Added hours and weeks	Home health and added hours	Home health and added hours and weeks
Remain at home	900	750	675	675	615
Employed between 9 A.M.-3 P.M. only	150	75	60	105	90
Employed within hours 8 A.M.-6 P.M. but not exclusively during 9 A.M.-3 P.M.	360	600	690	645	720
Employed hours other than 8 A.M.-6 P.M.	90	75	75	75	75
Total	1,500	1,500	1,500	1,500	1,500

Program V is a provision of school activities from 8 A.M.-6 P.M. and also home health services for 52 weeks.

Effectiveness

To compare these programs, we ask: How many mothers would have an improved choice of more satisfactory employment? Some mothers clearly have children below school age as well as children of school age and accordingly could not benefit from the program options as they are set forth. Some others are not able to work outside the home for other reasons. We then ask: How many mothers from among those with an improved choice would actually choose to work outside the home? What would be added to family income?

Information would have to be gathered in our hypothetical community to determine how many mothers would be affected and their potential earnings. Table 2 displays the information obtained on mothers' employment status under each program.

A total of 1,000 mothers is assumed for the children five years of age and over that are supervised by the school. Under the on-going program 600 of the mothers are assumed to remain at home and 400 to work outside the home. For each of the program options illustrative figures are displayed for the employment status of the 1,000 mothers. (We assume for the immediate period no net movement in or out of the community.)

Table 3 presents illustrative figures on added earnings that would be made possible by adoption of one or the other of the several program options. These illustrative figures reflect the assumed increases owing to (a) more mothers working and (b) more mothers who are enabled to take on full-time or more responsible jobs. It also includes saving in child care expenses which are being incurred by those mothers who work under the on-going school program. (Data would have to be developed that permit an estimate of such expenses.)

Costs of Programs

For each program option, cost figures that include the full cost implications of the additional child care services would be estimated. Various methods of cost calculation may be applied. For the hypothetical community with its distribution of mothers and pupils we have developed cost estimates based on on-going school costs by pupil. For the program options that include home health services as well as extended school supervisory activities cost calculations are based on total costs per home health service worker.

For example, there are assumed to be 1,500 pupils who are potential users of each program. The use pupils make of a program is likely to be determined by the employment status of the mothers.

Table 4 shows an illustrative distribution of pupils by the employment status of their mothers. (It has been assumed that there are 1½ pupils for every mother.)

How many of those potential users of the program offerings would use them? Table 5 shows the illustrative percentage of pupils in each category who are expected to make use of the program. (Data for this type of display could be collected by means of a survey or estimated by reference to the experience of other communities with similar types of programs.)

A "market-type" study on demand for home health service combined with school absenteeism data or health statistics would provide the information needed to make a calculation of requirements. For the table presented here we have filled in hypothetical numbers by assumption. For example, we have assumed that mothers working full time would make most use of day care programs, mothers working part of the day would choose to make less use of the facilities, and mothers remaining at home during the time the facilities were offered would make some but not much use of them.

In the illustrative figures an assumed peak load demand for home health services was taken into account because of the seasonal pattern of illness. For example, it was assumed

TABLE 5.—PERCENT OF PUPILS OPTING FOR EACH PROGRAM

Mothers' employment status	Program options									
	I	II	III		IV		V			
			Day care				Day care		Homemaking	
	On-going program	Day care 40 weeks	40 weeks	12 weeks	Day care 40 weeks	Home-making 40 weeks	40 weeks	12 weeks	40 weeks	12 weeks
Remain at home.....	100%	10%	10%	20%	10%	1%	10%	20%	1%	1%
Employed between 9 A.M. and 3 P.M. only	100	20	20	60	20	5	20	60	5	5
Employed within hours 8 A.M.-6 P.M. but not exclusively during 9 A.M.-3 P.M.	100	60	60	70	60	5	60	70	5	5
Employed hours other than 8 A.M.-6 P.M. ...	100	10	10	20	10	1	10	20	1	1

TABLE 6.—ILLUSTRATIVE NUMBER OF PUPILS OPTING FOR EACH PROGRAM—A COST WORK SHEET

Mothers' employment status	Program options								
	I	II	III		IV		V		
			Added hours and weeks		Home health and added hours		Home health and added hours and weeks		
			Day care		Day care	Home health	Day care		Home health
	On-going program	Added hours day care 40 weeks	40 weeks	12 weeks	40 weeks	40 weeks	40 weeks	12 weeks	40 weeks	12 weeks
Remain at home		75	68	136	68	7	62	124	6	6
Employed between 9 A.M. and 3 P.M. only		15	12	36	21	5	18	54	5	5
Employed between 8 A.M. and 6 P.M. but not exclusively 9 A.M. and 3 P.M.		360	414	483	487	32	432	504	36	36
Employed hours other than 8 A.M. and 6 P.M.		8	8	16	8	1	8	16	1	1
Total		458	502	671	484	45	520	698	48	48

that a maximum of 5 percent of pupils would stay in at home at any one time. After taking account of illness of siblings, it further was assumed that perhaps something over 3 percent of the homes would potentially need home health care at any one time.

It also was assumed that almost all of the working mothers would make use of home health services when needed, and that 20 percent of nonworking mothers would make use of these services.

Based on the illustrative percentage of pupils in each category of "employment status of mothers" the number of pupils who would use the alternative program offering may be estimated. The hypothetical figures are shown in Table 6.

After establishing the numbers of users of the program offering, the full added cost per user must be determined. Facility costs that are "fixed" and that would not be affected by the additional services would not be counted—school facility costs, for example. New equipment needs, however, would be included as would additional expenditures for staffing, fringe benefits, school meals, and so forth.

In setting down the estimates of dollar cost for the program option in our hypothetical case in Table 7 it was assumed that the additional cost for each program was as follows:

The 40-week program of 8-6 care was $700 per pupil.

The 12-week program of 8-6 supervision during the school recess period was $420 per pupil.

The home health costs for 40 weeks was $2,800 per worker.

The home health costs for 12 weeks was $800 per worker.

It was assumed that one home health worker would be required per household needing home health care.

An analysis would require an assessment of the availability of personnel and other resources to carry out each of the program options as well as of program benefits.

Summary of Effectiveness and Costs

We have defined several measures on the basis of which to judge the progress made by alternative programs toward satisfying the two defined objectives, namely:

1. To give mothers more choice in satisfactory employment
2. To enhance family income.

Two of the measures are dollar criteria and three are psycho-social criteria. The progress that would be made under each option is shown in Tables 2 and 3 and is displayed along with estimated costs in Table 8.

Clearly the types of data shown in Table 8 are more informative than the usual staff materials developed for policy officials. Moreover, qualifications on such informational materials help to put in perspective the analysis carried out.

In limiting the analysis, for example, to the employment of mothers as the defined objective, we have left out a host of important benefits that relate to other purposes. Included among those omitted are:

1. Benefits in learning, by children
2. Benefits to family and community from extra supervision of children
3. Reduction in community costs attributable to saving in public welfare, in juvenile delinquency, and untreated illness
4. Advances from poverty
5. Secondary expansion brought to the communities' economy through the mothers' expenditure of their extra income.

We also limited the analysis to a range of five options. On completion of the initial analysis, a decision may be reached as follows. The cut-off point of alternatives was too soon. Additional options need to be consid-

TABLE 7.—ILLUSTRATIVE ESTIMATES OF PROGRAM COSTS

Additional costs	Program options I: On-going program	II: Added hours	III: Added hours and weeks	IV: Home health and added hours	V: Home health and added hours and weeks
DAY CARE					
Additional costs per pupil					
$700 for 40 weeks	...	$321,000	$351,000	$339,000	$364,000
$420 for 12 weeks	...	...	282,000	...	293,000
HOME HEALTH					
(Costs per home health worker)					
$2,800 for 40 weeks	...	...	...	120,000	128,000
$800 for 12 weeks	...	...	...	...	38,000
Total	0	$321,000	$633,000	$459,000	$823,000

TABLE 8.—ILLUSTRATIVE SUMMARY INFORMATION PROVIDED TO DECISION MAKER

Evaluation criteria	Program options				
	I	II	III	IV	V
	On-going program	Added hours	Added hours and weeks	Home health and added hours	Home health and added hours and weeks
	Effectiveness to satisfy employment and income objectives [a]				
1. Mothers with improved choice	0	800	800	800	800
2. Mothers previously working obtaining more satisfactory employment	0	80	100	100	120
3. Mothers newly employed	0	100	150	150	190
4. Added family income and saving in child care costs	0	$300,000	$615,000	$530,000	$901,000
	Added costs				
5. Dollars of additional total costs in year [a]	0	$321	$633	$459	$823
	Other purposes served				
Improved learning of children					
Reduced social problems resulting from child neglect					
Reduced public dependency and poverty					
Higher community income (both present and in future)					

[a] From Tables 2, 3, and 7.

ered, for example, reduced age at which child care is provided, or home health services without other day-care facilities.

Ideally, analyses or programs of this nature should not be carried out exclusively for different levels of effort in only one year, but on a multi-year basis. Costs of the program may be highest in the first year while the program is being set up, whereas benefits may be lower in the first year. For example, not all mothers who *seek* employment may find it immediately. Furthermore, as the mothers work a longer period and gain experience, their average income may rise.

The purpose of this sample cost/benefit case has been to display some of the informational materials that would result from analysis. A full-scale analysis would involve many extra steps, but the same type of analytical approach would be applied and similar categories of critical information would be used.